Nepal Rastra Bank
Syllabus for
Mechanical Overseer and Mechanic
Contract

Stages of Examination

1. **First Stage:** Written Examination **Full Marks: 100** **Pass Marks: 40**
2. **Second Stage:** Interview **Full Marks: 20**

Remarks:

1. In written examination, questions shall be asked in English.
2. Objective questions will be asked.
3. 20% marks will be deducted for each incorrect answer.
4. The candidates selected from the written examination will be called for the second stage examination.
5. This syllabus is applicable from September 11, 2023.

First Stage: Written Examination Full Marks: 100 Time: 1 hour

Examination System	Section	Number of Question and Marks	Marks
Multiple Choice Questions	1	5 questions × 2	10
	2.1	5 questions × 2	10
	2.2	5 questions × 2	10
	2.3	5 questions × 2	10
	2.4	5 questions × 2	10
	2.5	5 questions × 2	10
	2.6	5 questions × 2	10
	2.7	5 questions × 2	10
	2.8	5 questions × 2	10
	2.9	5 questions × 2	10
Total	**50 questions × 2 Mark**		**100**

1. **General Awareness and Contemporary Issues**
   - **1.1** Geographical, socio-cultural, economic and demography of Nepal
   - **1.2** The Constitution of Nepal
   - **1.3** Governance system and Government (Federal, Provincial and Local)
   - **1.4** Government planning, budgeting and accounting system
   - **1.5** Banking and financial sector of Nepal
   - **1.6** Nepal Rastra Bank : history, objectives, organizational structure and functions
   - **1.7** Current Macroeconomic situation of Nepal
   - **1.8** Major events and current affairs of national and international importance
   - **1.9** Minting in Nepal: history, current scenario and coins in Nepal

2. **Technical Subject**

2.1 Machine Design, Estimating & Costing and Workshop Practices

2.1.1 Fundamental principles of machine

2.1.2 Design the simple machine elements for axial and torsional loading

2.1.3 Estimating and costing

- Purpose of estimating and costing
- Types of costs
- Ladder of costs
- Allocating of overheads
- Estimation of material cost
- Estimation in machine shop
- Estimation in welding, foundry and sheet metal shops

2.1.4 Workshop Practices

- Measuring Instruments - Scale, Try square, Bevel Protractor, Vernier Caliper, Micrometer, Gauges and Filler Gauges; Metric, FPS and SI Unit
- Hand tools and their applications
- Basic knowledge of Lathe, Milling, Shaper, Grinding and Drilling Machine

2.2 Hydraulics and Pneumatics

2.2.1 Fundamental of hydraulics and pneumatics

2.2.2 Industrial hydraulics

2.2.3 Industrial Pneumatics

2.2.4 Hydraulic and pneumatic circuits

2.2.5 General maintenance of hydraulic system and pneumatic system:

- Preventive Maintenance
- Diagnosis and testing of Hydraulic system and Pneumatic system

2.3 Maintenance Engineering

2.3.1 Definition, needs and objectives of maintenance

2.3.2 Causes and types of component failure

2.3.3 Wear reduction methods

2.3.4 Types maintenance: Break down, Preventive, Predictive and Proactive

2.3.5 Maintenance activities: Inspections, adjustments, testing, calibrations, rebuilds and replacements

2.4 Machine Elements and Mechanism

2.4.1 Machine elements: Shaft, axles, bearing, belt, pulleys, gear, chains ropes, power transmission, couplings, clutches, springs and seals

2.4.2 Joints/connection: detachable joints and permanents joints

2.4.3 Mechanisms: Lever mechanism, cam mechanism, wedge and screw mechanism, gear mechanism, friction mechanism, belt mechanism, hydraulic and pneumatic mechanism and electro mechanical mechanisms

2.5 Industrial Hygiene and Safety

2.5.1 Introduction and scope of industrial hygiene and safety

2.5.2 Principles and practices of safety management

2.5.3 Accident, causes of accident and accident prevention methods

2.5.4 Electrical safety

2.5.5 Fire Prevention and control

2.5.6 Material Handling : Factors affecting selection of means for handling of materials, mechanical material handling and handling of dangerous chemicals

2.5.7 Physical and chemical hazards and Safety measures in various operations

2.6 Thermodynamics

2.6.1 General : Boyle's law, Charles' law and combined gas law

2.6.2 First law of thermodynamics : Definition of the first law, total internal energy and mechanical equivalent of heat engine

2.6.3 Second law of thermodynamics : Definition of the second law and thermal efficiency of heat engine

2.6.4 Thermodynamics Properties of Fluid

2.6.5 Basic thermodynamics process: Constant volume process, constant pressure process, constant temperature process, adiabatic process and polytropic process

2.7 Applied Mechanics

2.7.1 Statics : Coplanner system of intersecting forces, coplanner parallel forces, the moment of a force, centre of gravity and friction

2.7.2 Kinematics : Definition of technical terms:- speed, velocity, acceleration, distance traversed and their units, the trajectory of particles, distance and time and rectilinear motion of a particle

2.7.3 Composition of a simple motion of a particle: Curvilinear motion of a particle and simple motion of a solid body

2.7.4 Dynamics : Fundamental laws of dynamics:- Newton's law of motion, Work, Energy and Power, Mechanical Energy, Relation between RPM, Torque and Power and Law of conservation of energy

2.8 Engineering Graphics and Machine Drawing

2.8.1 Finding out the missing views from two given projection and dimensioning

- Missing views of prismatic and cylindrical work pieces
- Missing views of pyramidal, conical, cylindrical cut work pieces

2.8.2 Isometry drawing of machine parts including sections

2.8.3 Drawing of joints, drawing exercises and orthographic projection

2.9 Metal cutting and forming, welding and Sheet Metal Works

2.9.1 Introduction and classification of cutting tools

2.9.2 Source of heat in metal cutting

2.9.3 Tool failure, tool life and tool wear

2.9.4 Bulk Deformation Processes

- Introduction
- Forging - Open Die, Impression Die, Closed Die
- Forging Dies, Hammers and Presses
- Rolling – Flat rolling and Shape Rolling
- Extrusion – Types of Extrusion; Dies and Presses
- Drawing – Wire, Bar and Tube Drawing

2.9.5 Welding and Sheet Metal Works

- Different types of welding and their applications
- Welding equipment, tools, accessories and types of electrodes
- Soldering and Brazing
- Welding defects, causes and remedies
- General Fitting - Male & Female Joints by Marking, Sawing, Chiseling, Cutting, Joining
- Cutting, Folding, Bending of Sheet Metal